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ठोस दिल्लेदार फोम यूपीवीसी दरवाजे के शटर — विशिष्टि

Indian Standard

SOLID PANEL FOAM UPVC DOOR SHUTTERS — SPECIFICATION

ICS 83.140; 91.060.50

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Doors, Windows and Shutters Sectional Committee, CED 11

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Doors, Windows and Shutters Sectional Committee had been approved by the Civil Engineering Division Council.

Due to restriction on use of timber from natural forests in the country, manufacturers of various timber products including door shutters have to depend largely on imported timber. As a result, various substitutes of timber are being considered for use as door shutters in residential buildings. Substitute materials are considered to be suitable for manufacture of door shutters based on properties such as good appearance and texture, high strength to weight ratio, resistance against shape instability, resistance against biological attack and energy efficiency.

Solid panel foam UPVC door shutters made from foam UPVC sheet is one of the latest developments in the plastic industry and a substitute of timber door shutters. The foam sheets used in the manufacture of such shutters can be produced either by a mechanical blowing process or by one of several chemical blowing techniques. Its low water vapour transmission and rigidity are advantageous in construction of various kinds of plastic building products. In view of its construction and properties being different from that of wood, a need was felt to formulate a standard that would provide proper guidance to users and manufactures of solid panel foam UPVC door shutters. This standard covers the requirements for solid panel foam UPVC door shutters made from rigid UPVC foam sheet as a panel insert. In formulation of this standard due weightage has been given to the standards and practices prevailing in the country.

Notwithstanding the advantages of modular coordination, it has been noticed that there is sufficient demand for sizes other than modular sizes. In view of the above, the standard permits non-modular sizes in addition to the modular sizes for door shutters. Non-modular sizes are particularly required in replacement of existing door shutters.

Annex C gives general guidelines on installation of solid panel foam UPVC door shutters.

The composition of the Committee responsible for the formulation of this standard is given in Annex D.

For the purpose of deciding whether a particular requirement of this standard, is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SOLID PANEL FOAM UPVC DOOR SHUTTERS — SPECIFICATION

1 SCOPE

1.1 This standard covers requirements regarding materials, sizes, construction, workmanship, finish and test of solid panel foam UPVC door shutters used in residential buildings, offices, schools, hospitals, community hall and similar applications.

1.2 This standard does not cover large size door shutters for industrial and other special buildings such as workshops, factories, garage and warehouse.

1.3 This standard covers solid panel foam UPVC door shutters for use in internal locations only where security is not of prime importance.

2 REFERENCES

The standards given at Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 2828 and IS 10428 and the following shall apply.

3.1 Virgin Material — Materials in such form as granules or powder that has not been subjected to use or processing other than that required for its manufacture and to which no reprocessed or recycled material has been added.

3.2 Own Re-work Material — Materials prepared from rejected unused rigid UPVC foam sheets, including trimmings from the production of rigid UPVC foam sheet, that can be re-processed in a manufacturer's plant by any process such as extrusion and for which the complete formulation is known.

3.3 Additives — Any material introduced prior to the final consolidation of rigid UPVC foam sheets to increase bonding or to improve some property of the final rigid UPVC foam sheet. Fillers and preservatives are included in this.

3.4 Blowing Agents — Blowing agent is a kind of additive used for producing pores or cells throughout the polymer mass.

3.5 Thermal Conductivity — It is the quantity of heat in the steady state condition lowing in unit time through a unit area of a slab of uniform material of infinite extent and of unit thickness, when unit difference of temperature is established between its face.

3.6 Warp — It is the dimensional distortion in a plastic material after moulding or other fabrication.

3.7 Type Tests — Tests carried out whenever a change is made in the composition of the material or in the size in order to establish the suitability and the performance capability.

3.8 Acceptance Tests — Tests carried out on samples taken from a lot for the purpose of acceptance of the lot.

4 MATERIALS

4.1 Composition of UPVC

4.1.1 Unplasticized polyvinylchloride to be used for the manufacture of UPVC sheet by free foaming process, shall be of suspension grade (K value of 57-60, when tested in accordance with IS 4669) and duly stabilized with chemical additives. The additives should be selected from the list given in IS 10148. None of the additives shall be used separately or together in quantities sufficient to constitute toxic, organoleptic or microbial health hazards.

4.1.2 The materials from which the UPVC sheet is produced shall not impair its physical and mechanical properties, fabrication and welding behaviour. Only such additives shall be included that help to facilitate the manufacture of sound and durable PVC sheet of good surface finish, mechanical strength and opacity under conditions of use.

4.1.3 The addition of the manufacturer's own re-work material to virgin material is permissible. The quantity of the re-work material used shall be declared by the manufacturer. No other re-work material from any other sources shall be used in the manufacturing of sheets.

NOTE — A test report on conformity may be obtained from the resin manufacturer's for the VCM content to check the limit as specified in **3.3.1** of IS 10151 and K value of the resin being used, unless the same is tested in an independent laboratory. The frequency of this test report or conformity certificate shall be once in every three months.

4.2 UPVC FOAM SHEET PANEL

4.2.1 *Visual Appearance*

The sheet shall be smooth, clean and free from other hidden internal defects such as air bubbles, pin holes, pits and other foreign inclusions. Slight longitudinal extrusion lines which may be visible but not discernable when felt by hand shall be permissible.

4.2.2 *Density*

When determined in accordance with IS 13360 (Part 3/ Sec 1), the density of sheet shall be 0.55 to 0.65 g/cm^3.

4.2.3 *Heat Reversion*

When tested by subjecting to a temperature of 70 ± 2 °C for 7 days as prescribed in IS 11239 (Part 3), a sheet of 200 ± 20 mm long shall not alter in length by more than 2 percent.

4.2.4 *Impact Strength*

When tested by the method prescribed in IS 13360 (Part 5/Sec 5), the sheet shall have no defect such as cracking, tearing or delamination. The depth of indentation shall be less than 0.3 mm.

4.2.5 *Tensile Strength*

When tested in accordance with the procedure given in IS 8543 (Part 4/Sec 1), the tensile strength of sheet shall not be less than 10 N/mm^2.

4.2.6 *Flexural Strength*

When tested in accordance with the procedure given in IS 13360 (Part 5/Sec 7), the flexural strength of sheet shall not be less than 20 N/mm^2.

4.2.7 *Screw Withdrawal Strength*

When tested in accordance with the procedure given in IS 4020 (Part 16), the screw holding capacity of 5 mm thick sheet shall not be less than 1 500 N across the face and 1 250 N across the edge.

4.2.8 *Thermal Conductivity*

When tested in accordance with the procedure described in IS 3346, the thermal conductivity shall not be less than 0.07 kcal/h/m/ °C.

4.3 Mild Steel Frame

Mild steel tube for frame shall meet the requirements in IS 4923. Mild steel tubes shall be of size 15mm × 15 mm for top and bottom rails and 19 mm × 19 mm for stiles.

4.4 Adhesive

Solvent cement used for jointing of panel, stile and rails shall conform to the adhesive properties specified in IS 14182.

5 CONSTRUCTION

5.1 Preparation of Rigid UPVC Foam Sheet

UPVC foam sheets are generally closed cells of rigid type that can be manufactured in controlled density and cell structure through free foaming process. The basic raw materials for the preparation of sheet are suspension grade UPVC, filler, pigment, stabilizer, impact modifier, lubricant and processing aid. A molten UPVC compound containing a blowing agent is extruded at a certain temperature and pressure through a slit orifice, to atmospheric pressure. In this condition, the mass expands several times its pre-extrusion volume. It is extruded in sheet form with a continuous surface skin that can be cut into standard sizes or fabricated into desired shapes.

5.2 Fabrication of Solid Panel Foam UPVC Door Shutter

Solid panel foam UPVC door shutter shall be constructed in the form of a mild steel framework of stiles and rails covered on all sides with UPVC sheet and with panel insert of UPVC foam sheet. A mild steel frame consisting of a square tube for stiles and rails of desired size is welded to the required dimension. The mild steel frame shall have a coat of corrosion resistant primer. Various components of door shutters in the required size (*see* Annex B) shall be cut from UPVC sheet. The UPVC sheet to be used for stiles is v-grooved to the desired depth in the centre of the sheet. The stiles shall be bent by localized heat into a ‘C’ section using jigs and fixtures. The UPVC panel is inserted in between the mild steel frame and then the UPVC stiles are pressed on the length of the frame. The gap between the panels and the ‘C’ section of the stiles is fitted with UPVC beading and bonded with the panels and the stile under pressure with the solvent cement adhesive. UPVC sheet are stuck on both sides of the panel to form rails. Lock rail at the centre is pressed on either side with UPVC sheet of required size. Gap inserts are fixed on the top and bottom of the doors with solvent cement to cover the mild tubular frame and seal the door from all sizes. The door is planed from top and bottom and finished to the exact size.

6 WORKMANSHIP AND FINISH

6.1 The surface of the shutters shall be free from any visible defects such as pin holes, small pores, crazing, blistering, wrinkling, impurities, colour blotches, etc.

6.2 The panels of the door shutters shall be flat and shall have smooth and level surface.

6.3 All the four edges of the door shutter shall be square. The shutter shall be free from twist or warp.

6.4 The colour of the door shutters shall be as agreed to between the purchaser and the manufacturer.

6.5 Scattered pin holes duly repaired and finished and not noticeable, shall be accepted.

6.6 No painting or primer shall be applied on the door shutter.

7 DIMENSIONS, SIZES AND TOLERANCES

7.1 The finished dimensions and tolerances of door shutters and its components shall generally conform to the modular sizes specified in Table 1 (*see* Fig.1). Sizes other than modular sizes as agreed to between the manufacturer and the purchaser may also be used.

> NOTE — Annex B provides guidance on the method of calculation of component parts of solid panel foam UPVC door shutter of different widths.

7.2 The nominal thickness of door shutters shall be of 30 mm for each of the sizes indicated in Table 1.

However, for sizes greater than that specified in Table 1, the thickness of the door shutters shall be as agreed to between the manufacturer and the purchaser but shall be more than 30 mm.

7.3 Tolerance

7.3.1 The tolerance on size of door shutters shall be $^{+3}_{-0}$ mm.

7.3.2 The tolerance on thickness of door shutters shall be $^{+2}_{-0}$ mm.

7.3.3 The tolerance on joinery of the components shall be $^{+5}_{-0}$ mm.

Table 1 Dimension and Tolerance of Door Shutter and Components
(*Clauses* 7.1 *and* 7.2)

Sl No. (1)	Width mm (2)	Height mm (3)	Stile mm (4)	Rail mm (5)
i)	700	2 005 (2 045)	50	75
ii)	800	2 005 (2 045)	75	100
iii)	900	2 005 (2 045)	100	125

NOTES

1 Standard sizes of door frame are covered in IS 4021.

2 The standard widths and heights for doors have been arrived at as shown in Fig. 2 In case the modular height is taken from the finished floor level, the height of the door shall be the one given in bracket.

3 Gap inserts of 15 mm shall be provided between stiles and rails and panels.

4 For door shutters larger than 1.6 m^2, an additional mild steel tube of 15mm × 15 mm shall be provided at a distance of 75 mm from the tube under the top rail.

8 FITTINGS AND ACCESSORIES

Suitable fittings like sliding door bolt, mortice lock and latch, floor door stopper, etc, as specified by the purchaser, shall be provided.

8.1 Floor Stoppers

8.1.1 Floor stoppers of size and shape as approved by the purchaser shall be fixed to the door shutters. Cleats and blocks of wood shall not be used under any circumstances.

8.2 Mortice Lock or Door Closers

8.2.1 Fixing shall be done by making a required opening in reinforced mild steel square tube and heat bent PVC C-channel. Shutters shall be shop prepared for taking mortice lock or door closers as may be ordered. Shop preparing the door shutter with morticed holes for lock fixing shall be done only when desired by the purchaser and the exact type, size and location of the mortice lock or door closer shall be specified by the purchaser at the time of order.

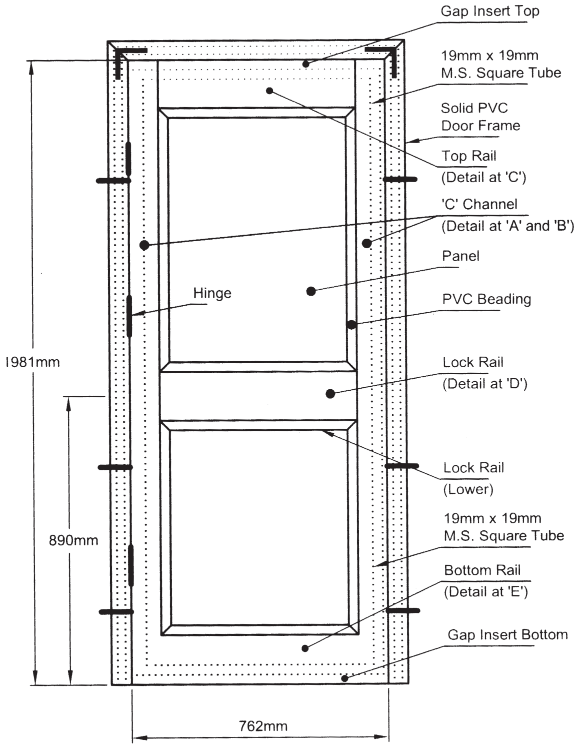
9 TESTS

9.1 Classification of Tests

9.1.1 *Acceptance Test*

The following shall constitute the acceptance tests:

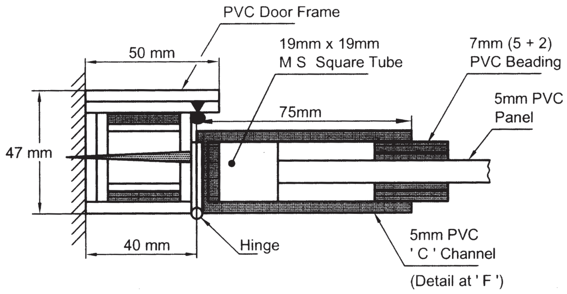
a) Dimensions and squareness test;


Gap Insert Top
19mm x 19mm M.S. Square Tube
Solid PVC Door Frame
Top Rail (Detail at 'C')
'C' Channel (Detail at 'A' and 'B')
Panel
Hinge
PVC Beading
1981mm
Lock Rail (Detail at 'D')
Lock Rail (Lower)
19mm x 19mm M.S. Square Tube
890mm
Bottom Rail (Detail at 'E')
Gap Insert Bottom
762mm

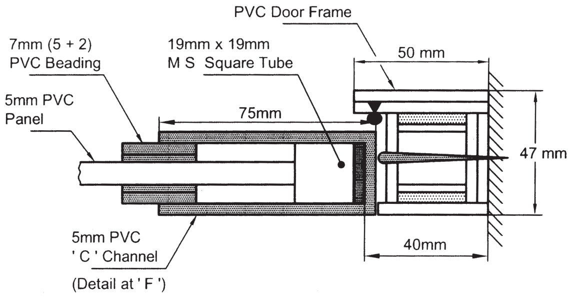
All dimensions in millimetres.

1A Sketch Illustrating Different Parts of Shutters

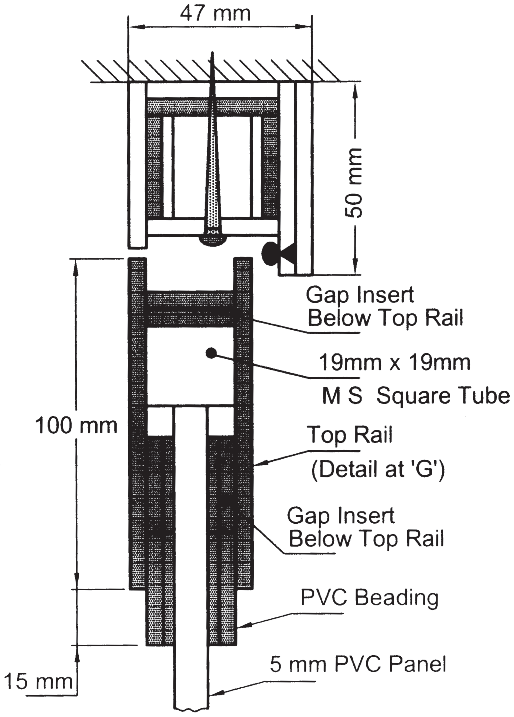
FIG. 1 SOLID PANEL FOAM UPVC DOOR SHUTTERS — *Continued*



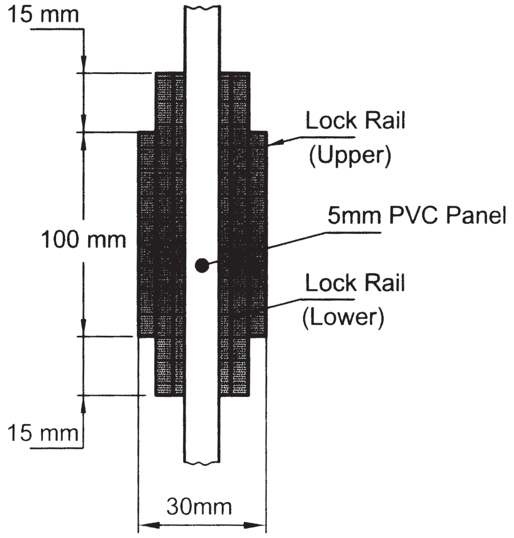
1B ‘C’ Channel — Detail at ‘A’



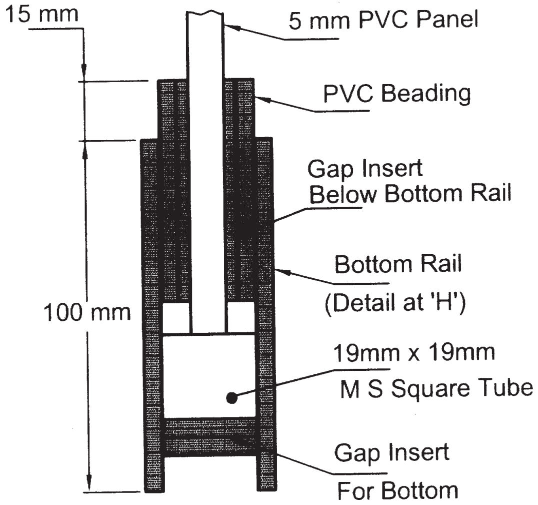
1C ‘C’ Channel — Detail at ‘B’



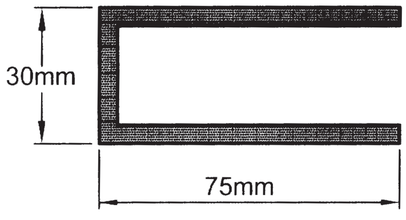
1D Top Rail — Detail at ‘C’



1E Lock Rail — Detail at ‘D’

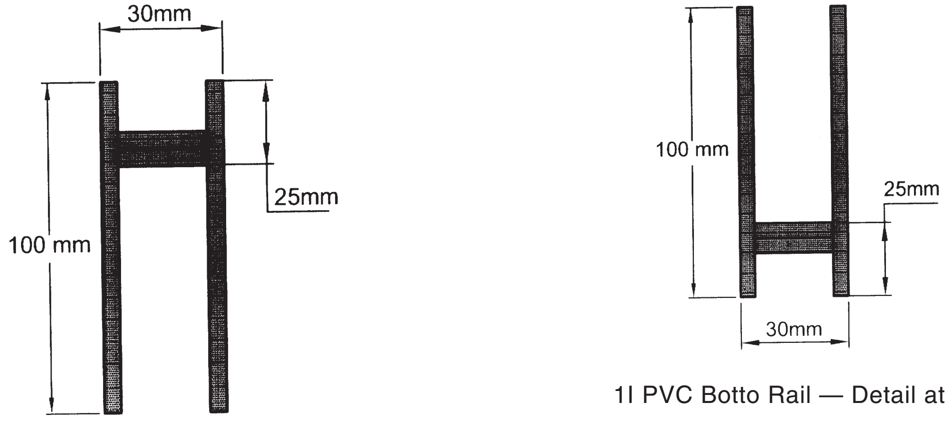


1F Bottom Rail — Detail at ‘E’



1G PVC ‘C’ Channel — Detail at ‘F’

FIG. 1 SOLID PANEL FOAM UPVC DOOR SHUTTERS — *Continued*



1I PVC Botto Rail — Detail at 'H'

1H PVC 'C' Channel — Detail at 'G'

FIG. 1 SOLID PANEL FOAM UPVC DOOR SHUTTERS

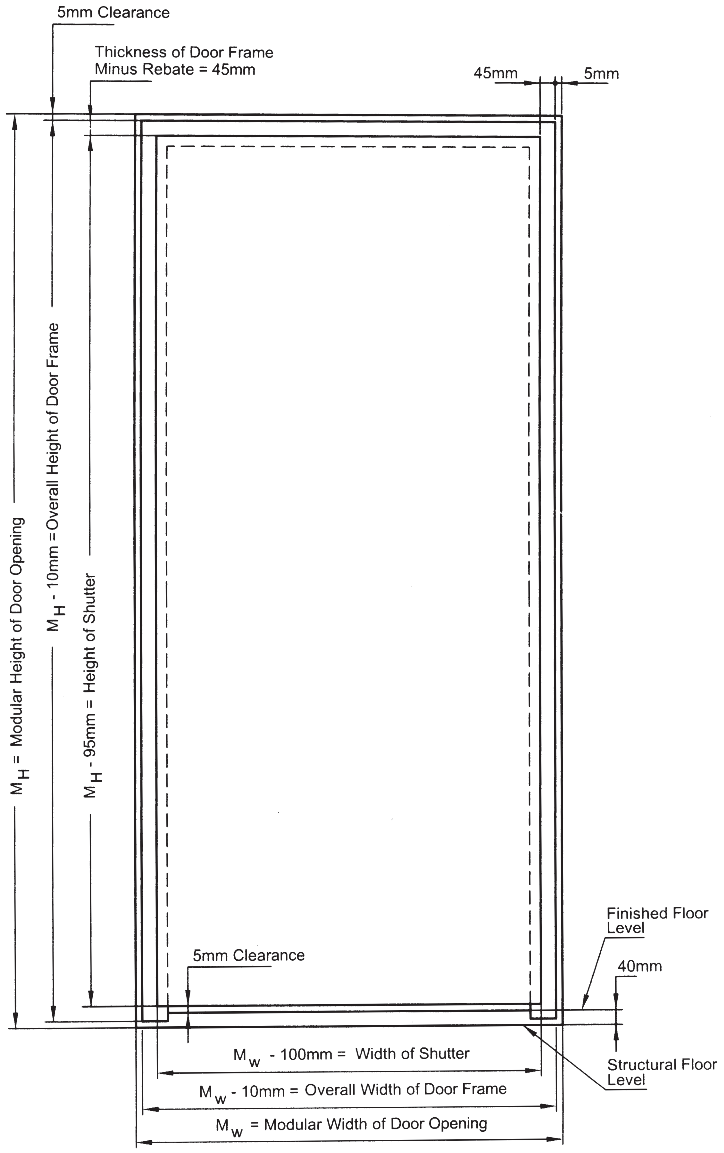

5mm Clearance
Thickness of Door Frame
Minus Rebate = 45mm
45mm
5mm
M$_H$ = Modular Height of Door Opening
M$_H$ - 10mm = Overall Height of Door Frame
M$_H$ - 95mm = Height of Shutter
5mm Clearance
Finished Floor Level
40mm
Structural Floor Level
M$_W$ - 100mm = Width of Shutter
M$_W$ - 10mm = Overall Width of Door Frame
M$_W$ = Modular Width of Door Opening

FIG. 2 SKETCH ILLUSTRATING DIMENSIONS OF SHUTTER

b) Workmanship and finish test;
c) Impact indentation test; and
d) Slamming test.

9.1.2 *Type Test*

The following shall constitute type (product approval) tests:

a) Dimensions and squareness test;
b) General flatness test;
c) Impact indentation test;
d) Edge loading test;
e) Shock resistance test;
f) Buckling resistance test;
g) Slamming test;
h) Misuse test; and
j) Screw withdrawal test.

10 REQUIREMENTS

10.1 Dimension and Squareness Test

When tested in accordance with IS 4020 (Part 2), the nominal width and height of door shutters shall be within a limit of $^{+3}_{-0}$mm. The nominal thickness of the shutter shall be within limit of $^{+2}_{-0}$mm . The difference in length of the diagonals shall not be more than 3 mm.

10.2 General Flatness Test

When tested in accordance with IS 4020 (Part 3), the twist, cupping and warping of door shutters shall not exceed 2 mm.

10.3 Impact Indentation Test

When tested in accordance with IS 4020 (Part 5), the shutters shall have no defect such as cracking, tearing or delamination and the depth of indentation shall not be more than 0.3 mm.

10.4 Edge Loading Test

When tested in accordance with IS 4020 (Part 7), the deflection of the edge of the door shutter at the maximum load shall not be more than 8 mm. On removal of the loads, the residual deflection shall not be more than 0.7 mm, failing which the test may be repeated on the other edge in the reverse direction.

10.5 Shock Resistance Test

When tested in accordance with **2.1** of IS 4020 (Part 8), there shall be no visible damage in any part of the door shutter after twenty five blows on both sides of the shutter. Slight depression at the struck point shall be permissible.

When tested in accordance with **3.1** of IS 4020 (Part 8), a normally hung door shutter with hanging, fixings and fastenings should withstand without any significant permanent deformation and without deterioration, one impact on both sides of the shutter.

10.6 Buckling Resistance Test

The buckling resistance test shall be carried out in accordance with IS 4020 (Part 9). The shutter shall not show any deterioration and any residual deformation more than 5 mm after 30 min of unloading (initial deflection will not be relevant).

10.7 Slamming Test

When tested in accordance with IS 4020 (Part 10), the door shutter shall not have any visible damage in any part at the end of 50 successive impacts.

10.8 Misuse Test

When tested in accordance with IS 4020 (Part 11), there shall not be any permanent deformation of the fixing or any other part of the doorset hindering its normal working after the test.

10.9 Screw Withdrawal Test

The screw withdrawal test shall be carried out in accordance with IS 4020 (Part 16) on the stiles where the hinges are fitted as well as where fittings and fixtures are mounted. The required load to withdraw the screw completely shall not be less than 1 000 N. On withdrawal, there shall be no visible damage to the surface either by delamination or extra embossing at the points of withdrawal.

11 SAMPLING AND CRITERIA FOR CONFORMITY

11.1 Lot

In any consignment, all the shutters of same size and type made from same raw materials and manufactured under similar conditions shall be grouped together to constitute a lot.

11.2 Sample Size

11.2.1 The number of samples to be taken from a lot shall depend on the size of lot and shall be in accordance with col 2 and col 3 of Table 2.

11.2.2 The shutters shall be selected at random from the lot. In order to ensure the randomness of selection, the procedure given in IS 4905 shall be followed.

11.3 Number of Tests

11.3.1 *Dimensional Requirements*

The number of shutters selected for the first sampling in accordance with col 3 of Table 2 shall be checked for dimension and tolerance (*see* **10.1**). A shutter failing to satisfy any of the requirements shall be considered as defective.

11.3.2 *Workmanship and Finish*

The lot having satisfied dimensional requirements as in col 3 of Table 2 shall be tested for workmanship and finish (*see* **6**). The number of shutters shall be as per col 3 of Table 2. A shutter failing to satisfy any of the requirements shall be considered as defective.

11.3.3 *Impact Indentation Test*

The lot having satisfied dimensional requirements shall be tested for impact indentation test given in **10.3**. The number of shutters for the test shall be as per col 4 of Table 2. A shutter failing to satisfy any of the requirements shall be considered as defective.

11.3.4 *Slamming Test*

The lot having satisfied dimensional requirements shall be tested for slamming test given in **10.7**. The number of shutters for the test shall be as per col 4 of Table 2. A shutter failing to satisfy any of these requirements shall be considered as defective.

11.3.5 Type test on shutters shall be carried out the first time the product is assessed for suitability and performance capability and at least once a year or whenever there is a change in the composition of material or in size.

11.4 Criteria for Conformity

A lot shall be considered as having satisfied the requirements of dimension and workmanship and finish in the standard, if the number of defective shutters in the sample does not exceed the corresponding permissible number of defectives as given in col 5 of Table 2. All shutters in the sample shall pass in impact indentation test and slamming test.

12 MARKING

12.1 Door shutters shall be clearly and indelibly marked on exposed edge of a rail with the following information:

a) Manufacturer's name or trade-mark;
b) Whether the size of the shutter is 'Modular' or 'Non-modular';
c) Width and height for modular sizes as specified in Table1, or the actual size (width and height in case of non modular sizes);
d) Lot or batch number and year of manufacture; and
e) For indoor use only.

12.2 BIS Certification Marking

The shutters may also be marked with the Standard Mark.

12.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which a licence for the use or the Standard Mark may be granted to the manufacturers or producers may be obtained from the Bureau of Indian Standards.

Table 2 Sample Size and Criteria for Conformity

(*Clauses* 11.2.1, 11.3.1, 11.3.2, 11.3.3, 11.3.4 *and* 11.4)

Sl No. (1)	Lot Size (2)	Sample Size (3)	Sub-sample Size (4)	Permissible No. of Defectives (5)
i)	26-50	5	1	0
ii)	51-100	8	2	0
iii)	101-150	13	2	1
iv)	151-300	20	3	2
v)	301-500	32	4	3
vi)	501-1 000	50	5	5
vii)	1 001 and above	80	8	7

NOTE — For lots containing 25 or less number of shutters, sampling shall be as agreed to between the purchaser and the supplier.

13 STORAGE OF DOOR SHUTTERS

As far as possible the door shutter should be stacked in their original packing vertically. In case it is not possible to stack the shutters vertically, the shutters may be stacked horizontally, in their original packing. Not more than thirty door shutters should be placed in a single stack. The shutters with their packing should be placed one on top of the other without any offset.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

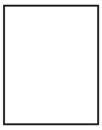
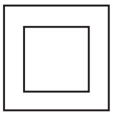
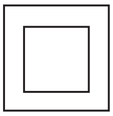
IS No.	*Title*
2828 : 2001	Plastic — Vocabulary (*first revision*)
3346 : 1980	Method for the determination of thermal conductivity of thermal insulation materials (two slab guarded hot plate method) (*first revision*)
4020 (Parts 1 to 16) : 1998	Door shutters — Methods of tests (*third revision*)
4021 : 1995	Timber, door window and ventilator frames — Specification (*third revision*)
4669 : 1968	Methods of test for polyvinyl chloride resins
4905 : 1968	Methods for random sampling
4923 : 1997	Hollow steel sections for structural use (*second revision*)
8543 (Part 4/ Sec 1) : 1984	Methods of testing plastics: Part 4 Short-term, mechanical properties, Section 1 Determination of tensile properties
10148 : 1982	Positive list of constituents of polyvinyl chloride resins and its copolymers for safe use in contact with foodstuffs, pharmaceuticals and drinking water
10151 : 1982	Specification for polyvinyl chloride (PVC) and its copolymers for its safe use in contact with food stuffs, pharmaceuticals and drinking water
10428 : 1983	Glossary of terms relating to doors
11239 (Part 3) : 1985	Methods of test for rigid cellular thermal insulation materials: Part 3 Dimensional stability
13360	Plastics — Methods of testing:
(Part 3/Sec 1) : 1995	Physical and dimensional properties, Section 1 Determination of density and relative density of non-cellular plastics
(Part 5/Sec 5) : 1995	Mechanical properties, Section 5 Determination of Charpy impact strength
(Part 5/Sec 7) : 1996	Mechanical properties, Section 7 Determination of flexural properties
14182 : 1994	Solvent cement for use with unplasticized polyvinyl chloride plastic pipes and fittings

ANNEX B

(*Clauses* 5.2 *and* 7.1)

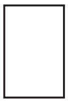
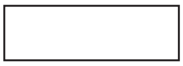
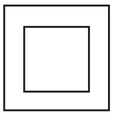
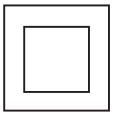
DIMENSIONS OF COMPONENTS OF DOOR SHUTTERS

B-1 DIMENSIONS OF VARIOUS COMPONENTS OF PVC FOAM SOLID PANEL DOOR SHUTTER OF WIDTH 700 MM

Sl No.	*Component*	*Quantity*	*Size of Each Component to Cut*		*Diagram*
			Length mm	Width mm	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Panel	1	$L - 60$	$W - 60$	
ii)	'C' channel	2	L	131.25	
iii)	Strips for 'C' channel	2	L	20	
iv)	Top rail	2	75	$W - 100$	
v)	Lock rail (Top)	2	75	$W - 100$	
vi)	Lock rail (Lower)	2	105	$W - 130$	
vii)	Bottom rail	2	75	$W - 100$	
viii)	Beading for 'C' channel	4	$L - 120$	30	
ix)	Beading for top rail	2	$W - 70$	30	
x)	Beading for bottom rail	2	$W - 70$	30	
xi)	Mild steel square tube for 'C' channel	2	$L - 40$	15	
xii)	Mild steel square tube for top and bottom rail	2	$L - 50$	15	
xiii)	Gap insert at top and bottom	4	15	$W - 10$	

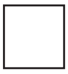
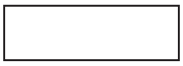
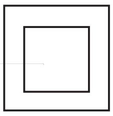
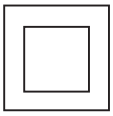
NOTE — L = height of door shutter, and W = width of door shutter.

B-2 DIMENSIONS OF VARIOUS COMPONENTS OF PVC FOAM SOLID PANEL DOOR SHUTTER OF WIDTH 800 mm

Sl No.	*Component*	*Quantity*	*Size of Each Component to Cut*		*Diagram*
			Length mm	Width mm	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Panel	1	*L* – 50	*W* – 50	
ii)	‘C’ channel	2	*L*	181.25	
iii)	Strips for ‘C’ channel	2	*L*	20	
iv)	Top rail	2	100	*W* – 150	
v)	Lock rail (Top)	2	100	*W* – 150	
vi)	Lock rail (Lower)	2	130	*W* – 180	
vii)	Bottom rail	2	100	*W* – 150	
viii)	Beading for ‘C’ channel	4	*L* – 170	30	
ix)	Beading for top rail	2	*W* – 120	30	
x)	Beading for bottom rail	2	*W* – 120	30	
xi)	Mild steel square tube for ‘C’ channel	2	*L* – 40	15	
xii)	Mild steel square tube for top and bottom rail	2	*L* – 50	15	
xxiii)	Gap insert below ‘C’ channel	4	*L* – 170	15	
xiv)	Gap insert below top and bottom rail	4	*L* – 120	15	
xv)	Gap insert at top and bottom	4	15	*W* – 10	

NOTE — *L* = height of door shutter, and *W* = width of door shutter.

B-3 DIMENSIONS OF VARIOUS COMPONENTS OF PVC FOAM SOLID PANEL DOOR SHUTTER OF WIDTH 900 mm

Sl No.	*Component*	*Quantity*	*Size of Each Component to Cut*		*Diagram*
			Length mm	Width mm	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Panel	1	*L* – 50	*W* – 50	
ii)	‘C’ Channel	2	*L*	231.25	
iii)	Strips for ‘C’ channel	2	*L*	20	
iv)	Top rail	2	125	*W* – 200	
v)	Lock rail (Top)	2	125	*W* – 200	
vi)	Lock rail (Lower)	2	155	*W* – 230	
vii)	Bottom rail	2	125	*W* – 200	
viii)	Beading for ‘C’ Channel	4	*L* – 220	30	
ix)	Beading for top rail	2	*W* – 170	30	
x)	Beading for bottom rail	2	*W* – 170	30	
xi)	Mild steel square tube for ‘C’ channel	2	*L* – 40	15	
xii)	Mild steel square tube for top and bottom rail	2	*L* – 50	15	
xiii)	Gap insert below ‘C’ channel	—	*L* – 220	15	
xiv)	Gap insert below top and bottom rail	—	*L* – 170	15	
xv)	Gap insert at top and bottom	4	15	*W* – 10	

NOTE — *L* = height of door shutter, and *W* = width of door shutter.

ANNEX C

(*Foreword*)

INSTALLATION OF DOOR SHUTTER

C-1 The solid panel foam UPVC door shutter fabricated shall be fixed to the door frame with anodized aluminium butt hinges of required size, by using No. 8, 20 mm long counter sunk, fully threaded parallel shank aluminium screws. In case the UPVC shutter is to be fixed to wooden frame/PVC frame, the screws to be used in the butt hinge shall be No. 8, 35 mm counter sunk fully threaded parallel shank aluminium screws.

C-2 Unless otherwise specified, each door shutter shall be fixed to the frame with four aluminium hinges of size 75 mm × 45 mm x 3.2 mm, by the purchaser. The top and bottom hinges shall be fixed at a location 100 mm below top and 100 mm above the bottom of shutter. The other two hinges shall be placed at one-third distance between top and bottom hinges.

C-3 For fixing butt hinges to UPVC shutter No. 8, 25 mm long counter sunk fully threaded parallel shank mild steel screws shall be used. All screws shall be screwed in by drilling a hole and using a screwdriver. In no case shall these be hammered in.

C-3.1 Use of plastic sleeves may be made for the purpose of re-fixing of screws.

ANNEX D

(*Foreword*)

COMMITTEE COMPOSITION

Doors, Windows and Shutters Sectional Committee, CED 11

Organization	*Representative(s)*
Central Public Works Department, New Delhi	Shri T. K. Sinha (***Chairman***)
A. P. Road and Buildings, Hyderabad	Chief Engineer
Anand Industries Limited, New Delhi	Shri H. S. Anand Shri P. N. Anand (*Alternate*)
B. G. Shirke Construction Technology Ltd, Pune	Shri S. K. Wagh Shri Y. B. Pathan (*Alternate*)
Builders Association of India, Chennai	Shri M. S. K. Vasudeva Rao Shri M. Sathyanarayanamurthy (*Alternate*)
Building Material & Technology Promotion Council, New Delhi	Chief
Central Building Research Institute, Roorkee	Dr B. Singh Shri S. K. Saini (*Alternate*)
Central Public Works Department, New Delhi	Shri R. K. Kakar
Central institute for Plastics & Engineering Technology, Chennai	Shri Sanjay K. Chattopadhyay Shri R. K. Dwivedi (*Alternate*)
Department of Telecommunication, New Delhi	Representative
Directorate General of Supplies & Disposals, Bangalore	Shri A. Tirkey Shri S. K. Agarwal (*Alternate*)
Engineer-in-Chief's Branch, New Delhi	Shri N. B. Shelar Shrimati Rivoo Mahendru (*Alternate*)
Engineers India Ltd, New Delhi	Shri J. K. Bhagchandani Shri Samir Das (*Alternate*)
Forest Research Institute, Dehra Dun	Shri Vimal Kothiyal Shri D. P. Khali (*Alternate*)
Housing & Urban Development Corporation Ltd, New Delhi	Shri Ramvir Singh
Indian Building Congress, New Delhi	Shri K. Mayank Tilak
Indian Plywood Industries Research & Training Institute, Bangalore	Shri M. Venugopala Naidu Shri Anand Nandanwar (*Alternate*)
Kutty Flush Door & Furniture Co Pvt Ltd, Chennai	Shri K. Sankarkrishnan Col Y. G. Krishnan (*Alternate*)
Mangalam Timber Products Ltd, Kolkata	Shri G. S. Gupta Shri R. K. Aima (*Alternate*)

Organization	*Representative(s)*
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Multiwyn Industrial Corporation, Kolkata	Shri B. K. Jhajaharia Shri Vishal Jhajaharia (*Alternate*)
National Test House, Kolkata	Shri D. V. S. Prasad Shri Aloke De (*Alternate*)
National Mission on Bamboo Application, New Delhi	Representative
Nuchem Limited, New Delhi	Shri Sudev Barar Shri P. B. Venkatsastry (*Alternate*)
PWD Haryana, Chandigarh	Shri R. K. Gandhi
Rajasthan Housing Board, Jaipur	Shri B. N. Moolchandani Shri D. C. Babel (*Alternate*)
RV-TIFAC Composites Design Centre, Bangalore	Representative
BIS Directorate General	Shri A. K. Saini, Scientist 'F' and Head (CED) [Representing Director General (*Ex-officio*)]

Member Secretary
Shri J. Roy Chowdhury
Scientist 'E' (CED), BIS

Plastic Doors, Windows and Shutters Subcommittee, CED11 : 3

Central Institute of Plastics & Engineering. Technology, Chennai	Director **(*Convener*)**
Builders Association of India, Chennai	Shri U. Prabakaran
Building Materials & Technology Promotion Council, New Delhi	Director
Central Building Research Institute, Roorkee	Dr L. K. Aggarwal Shri B. Singh (*Alternate*)
Central Institute of Plastics & Engineering Technology, Bhubaneswar	Dr S. K. Nayak Shri S. K. Chattopadhyaya (*Alternate*)
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Rajshri Plastiwood Ltd, Indore	Shri Ravi Barjatya Shri Anurag Tandon (*Alternate*)
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Headquarters:

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